CLAIMS

1. A real, physical radiation phantom for simulating a portion of a human being, the phantom comprising:

a body portion providing an analytic outer shape of the phantom, the outer shape being similar to a shape of at least a portion of the human being, the body portion having a first physical characteristic of a first value similar to a second value of the first physical characteristic corresponding to human soft tissue; and

at least one internal component disposed in the body, the internal component having an analytic shape approximating an internal portion of human anatomy and having a third value of the first physical characteristic different from the first value.

2. The phantom of claim 1 wherein the first physical characteristic is one of density and effective atomic number.

3. The phantom of claim 2 wherein the at least one internal component is configured to approximate a shape of a human bone and the third value is one of an average density of the human bone and an effective atomic number of the human bone.

4. The phantom of claim 1 wherein the at least one internal component is configured to approximate a shape of a human bone, at least a part of the at least one internal component including multiple portions configured to simulate different layers of bone, the multiple layers including a first portion having a first density and a first atomic number similar to a density and atomic number of an outer, relatively harder layer of human bone and a second portion inside the first portion and having a second density and a second atomic number similar to a density and atomic number of an inner, relatively softer layer of human bone.

5. The phantom of claim 1 wherein the at least one internal component comprises multiple internal components of shapes approximating internal components of the human being and having corresponding densities and atomic numbers similar to the corresponding internal components of the human being.

6. The phantom of claim 5 wherein the multiple internal components have densities and atomic numbers similar to at least one of bone, soft tissue, lung, and fat.

7. The phantom of claim 1 wherein the phantom provides at least one hole configured to receive a radiation detector and sized to permit rotation of the radiation detector inside the phantom.

8. The phantom of claim 1 wherein the phantom provides at least one passage extending from an outer surface of the body to a cavity defined inside the phantom, the passage being configured to convey at least one of gas and liquid to the cavity.

9. A real-virtual phantom system comprising:

an anthropomorphic virtual phantom that includes analytic shapes representing human anatomical parts; and

an anthropomorphic real, physical phantom that approximates the virtual phantom in a radiation-relevant manner with a first material that simulates human soft tissue and at least one second material that simulates other tissue that affects radiation differently than soft tissue, the at least one second material having an analytic shape that approximates a corresponding portion of human anatomy.

10. The system of claim 9 wherein corresponding portions of the virtual and real phantoms have similar densities and atomic numbers.

11. The system of claim 10 wherein the densities and atomic numbers correspond to at least one of bone, soft tissue, lung, and fat.

12. The system of claim 9 wherein the real phantom provides at least one hole configured to receive a radiation detector and sized to permit rotation of the radiation detector inside the phantom.

13. The system of claim 9 wherein the real phantom provides at least one passage extending from an outer surface of the real phantom to a cavity defined inside the real phantom, the passage being configured to convey at least one of gas and liquid to the cavity.

14. The system of claim 9 wherein the anthropomorphic virtual phantom comprises numerical expressions disposed on a computer-readable medium.

15. The system of claim 9 wherein the analytic shapes of human anatomical parts of the anthropomorphic virtual phantom represent human anatomical parts that are high-probability targets for radiation therapy.

16. A method of using a first virtual radiation phantom, the method comprising:

calculating a first radiation distribution from a first radiating device in the first virtual radiation phantom, the first virtual radiation phantom modeling human anatomical components as analytic shapes; and

comparing indicia of the first radiation distribution with information from a second radiation distribution.

17. The method of claim 16 wherein the information from the second radiation distribution is information of radiation detected in a first physical phantom

configured to approximate physical characteristics modeled by the first virtual radiation phantom in a radiation-relevant way.

18. The method of claim 17 wherein the first virtual radiation phantom and the physical phantom are substantially similar to a second virtual radiation phantom and a second physical phantom used with a second radiating device as part of a clinical test.

19. The method of claim 17 further comprising troubleshooting the first radiating device if appropriate as determined from the comparing.

20. The method of claim 19 further comprising radiating a human patient and providing information associated with radiating the human patient to a repository of information for a clinical test.

21. The method of claim 20 wherein the radiating comprises radiating the patient with an IMRT device.

22. The method of claim 17 further comprising performing an analysis on at least one of the indicia of the first radiation distribution and the information from the second radiation distribution and adjusting radiation parameters of the first radiating device, if appropriate, based upon the analysis.

23. The method of claim 16 wherein the information from the second radiation distribution is information calculated using a Monte Carlo radiation transport analysis.